UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/607,834	06/27/2003	Viola Vogel	UWOTL129036	4707

26389 7590 04/17/2007

CHRISTENSEN, O'CONNOR, JOHNSON, KINDNESS, PLLC
1420 FIFTH AVENUE
SUITE 2800
SEATTLE, WA 98101-2347

EXAMINER	
PORTNER, VIRGINIA ALLEN	
ART UNIT	**PAPER NUMBER**
1645	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/17/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/607,834	VOGEL ET AL.	
	Examiner	Art Unit	
	Ginny Portner	1645	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-85* is/are pending in the application.

4a) Of the above claim(s) *3,5,10-15,26-85* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6-9,16-20 and 22-25* is/are rejected.

7)☒ Claim(s) *8,9 and 21* is/are objected to.

8)☒ Claim(s) *1-85* are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/03;7/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claims 1-85 are pending.

Election/Restrictions

1. Claims 3,5, 8 (truncated lectin domain species), 10-15,26-85, withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions and species, which includes mixtures of a plurality of adhesins and/or ligands, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on January 10, 2007.

2. Claims 1-2,4,6-9,16-25 are under consideration.

1. Applicant's election with traverse of Group I, in the reply filed on January 10, 2007 is acknowledged, wherein the species elected for examination is

a method of **changing the binding strength** between an adhesion molecule and its binding ligand, classified in class 422, subclass 186: the species combination being:

Increase change in bond stress

Shear force

FimH polypeptide (clams 8-9)

Mannose (free or attached to a particle, monomannose, trimannose or oligomannose)

Mannose attached to bacterial pili

The traversal is on the ground(s) that all claims should be found allowable if claim 1 is found allowable and the examination of the entire application cannot constitute a serious burden.

These arguments have been fully considered but are not found to be persuasive for the reasons below.

First, the classification system has no statutory recognition whether inventions are independent and distinct. For example, each class and subclass is comprised of numerous completely independent and distinct inventions.

Second, MPEP 803 states that restriction is proper between patentably distinct inventions where the inventions are (1) independent or distinct as claimed and (2) a serious search and examination burden is placed on the examiner if restriction is not required..

The term distinct is defined to mean that two or more subjects as disclosed are related, for example, as product and method of use, but are capable of separate manufacture, use or sale as claimed, and are patentable over each other (see MPEP 802.1). In the instant situation, the inventions of Groups I-XI are drawn to distinct inventions which are related as separate products capable of separate functions. Restrictions between the inventions is deemed to be proper for the reason previously set forth.

In regard to burden of search and examination, MPEP 803 states that a burden can be shown if the examiner shows either separate classification, different field of search or separate status in the art. In the instant case a burden has been established in showing that the inventions of Groups I-XI are classified separately necessitating different searches of issued US Patents. However, classification of subject matter is merely one indication of the burdensome nature of search. The literature search, particularly relevant in this art, is not co-extensive, because for example methods of changing the binding strength of an adhesion molecule and methods of removing a target particle from a fluid utilizing an adhesion molecule are clearly different process that result in different results and comprise different methods steps. Additionally, it is submitted that the inventions of Groups have acquired a separate status in the art. Clearly different searches and issues are involved in the examination of each Group.

For these reasons the restriction requirement is deemed to be proper and is therefore made Final.

Allowable Subject Matter

Applicant's elected species directed to a method that results in an increased change in bond stress, through Shear force, the bond being between a FimH polypeptide (claims 18) attached to a bacterial pili carrier particle and Mannose attached to a bacterial pili carrier particle (claim 20), this species defines over the prior art of record, but the claims are objected to as being dependent upon a rejected base claim and for not reciting specifically the elected species of clams 8-9 and 16-17.

Information Disclosure Statement

2. The information disclosure statement filed November 6, 2003 and July 14, 2004 have been considered.

Specification

3. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01. At page 22, line 31, page 27, line 16 and page 67, line 21, the hyperlinks should be inactivated or deleted.

4. Additionally the figures refer to colored ball and stick residues; figures are published in black and white, therefore the narrative will be unclear when published. Clarification is requested.

Claim Objections

5. Claim 21 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 21 recites the limitation "wherein said I-FABSDAM is also attached to said particle" in reference to all of the species recited in claim 20. Claim 20 already

recites the term I-FABSDAM which are attached to prokaryotic and eukaryotic particles of claim 20. Claim 21 is not further limiting of claim 20 for the species that already have the I-FABSDAM already attached to the particle.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: Claim 1 recites the methods step of "changing a bond stress on said I-FABSDAM wherein said binding strength increases when said bond stress increase and decreases when said bond stress decreases". In light of the fact that a bond is defined to be an association between two molecules, one being an adhesion and the other being a ligand, and claim 1 only recites a single methods step that only provides the adhesion molecule the second essential element of the bond stress relationship is missing. The methods step of claim 1 is incomplete. While the preamble of the claim recites both molecules, the claimed methods step only recites a single element, when a bond requires two essential elements, the adhesion and the ligand.

7. Claim 20 recites the limitation "prokaryotic cells to which said I-FABSDAM is not native, eukaryotic cells to which said I-FABSDAM is not native" in reference to the phrase "wherein said FABSDA-L is attached to a particle". The two recited species " prokaryotic cells to which said I-FABSDAM is not native, eukaryotic cells to which said I-FABSDAM is not

native" do not find antecedent basis in the **FABSDA-L**. There is insufficient antecedent basis for these limitations in the claim.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

10. Claims 1-2,4,6-9,16-17,18, 19-20, 22-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Pascual et al (WO97/18790) in light of Spevak et al 1996 incorporated by reference (particle attached carbohydrate).

Pascual et al disclose the instantly claimed method, the method comprising the step (see page 12, lines 15-33; page 30, lines 33-36 "an in vitro shear assay system"; "Assessment of the adhesivity of pathogens with target cell receptors under different levels of shear force (see page 31, lines 10-19)" , see page 41 of :

Instant claim 1,22, 85: Changing a bond stress of an isolated force activated bond stress dependent adhesion molecule (see page 60 line 17 "purified"; page 64, lines 21-22 "purified adhesion of adhesion-positive microbes"; page 16, Table 1, and lines 6-7 "in vitro assays under high shear conditions designed to

reflect blood flow"; E-selectin; P-selectin; L-selectin binding to ligands on endothelium or leukocytes, wherein binding increases in the presence of shear force (shear, positive binding) and decreases in the absence of shear forces ("static" and negative binding).

to a force activated bond stress dependent binding ligand; protein-carbohydrate interactions (see page 13, lines 9-10) ; "different glycoconjugates that function as counter-receptors for pathogen adhesion molecules" (page 19, lines 31-32); also see page 32, lines 18-27 "adhesion molecule of a pathogenic organism which interacts with receptor molecules of a cell); "multivalent assemblies displaying carbohydrate ligands (page 59, lines 31-32).

Instant claim 2: wherein the bond stress is shear force (see page 16, Table 1, and lines 6-7 "in vitro assays under high shear conditions designed to reflect blood flow";

Instant claim 4: binding increases in the presence of shear force (shear, positive binding) and decreases in the absence of shear forces ("static" and negative binding). (see page 16, Table).

Instant claim 6: wherein the method results in tightly bound adhesion and ligand binding (See page 17 "shear-dependent attachment and rolling".; "activation dependent adhesion strengthening (slowed rolling), followed by tight adhesion").

Instant claim 7: wherein the adhesion molecule is microbial lectins (see page 17, lines 16-30), or an adhesin, selectin, integrin, immunoglobulin superfamily cell adhesion molecule or microbial lectin

Instant claim 8: wherein the adhesion comprises polypeptide (see claim 30, "the adhesive lectin region on fibriae displayed on microbes selected from the group consisting of Escherichia coli, Neisseria gonorrhoeae, Neisseria meningitides, Salmonella typhi, Salmonella typhimurium, Pseudomonas aeruginosa and Yersinia enterocolitica, page 87 and page 71, Salmonella typhi and typhimurium, fimbrial adhesion binds to mannose, and is therefore a FimH polypeptide. polypeptide). "Lectins frequently appear on the surface of the cell, on specific organelles, such as bacterial fimbriae or are part of the structure of exotoxins elaborated by bacteria."

Instant claim 9: wherein the FimH polypeptide is an E.coli FimH polypeptide (see page 71, E.coli binding to mannose, and therefore is a FimH, E.coli polypeptide). While the reference does not mention the term "FimH", in light of evidence provided by Swiss-Prot accession numbers P08191 and Q9R5Y2 that show both E.coli and Salmonella to express a polypeptide that binds to mannose and is referred to as FimH.

Instant claim 16-17: mannose or oligomannose (see mono or oligosaccharide, both simple or complex (page 11, lines 35-36; and page 71, carbohydrate specificity column "Mannose"). see page 11, lines 35-36 and page 12, lines 1-7 "Lectins bind reversibly and noncovalently with mono or oligosaccharides, both simple and complex" and page 72, lines 16-17).

Instant claim 18: wherein the adhesion molecule is attached to a particle, the particle being a bacterial pili (also known as Fimbrial adhesion, see page 71) being "bead-bound"(see page 41, lines 16-17); see "E.coli coated beads (see page 44, line 40), or "purified glycoproteins" that are incorporated into screening matrices (see page 60, lines 16-22 and page 61) thus producing a synthetic molecule associated with a synthetic substrate surface.

Instant claim 19: wherein the ligand is attached to a particle (see page 59, Example 14 "carbohydrate terminated matrices" in light of Spevak et al, 1996, incorporated by reference) purified ligand coated on the luminal surface of a capillary tube reaction chamber" see page 56, lines 28-31)

Instant claim 20: ligand attached to a particle, the particle being a synthetic molecule (in light of teaching by Spevak et al incorporated by reference, particles), or coated on a device surface which is a synthetic substrate surface.

Instant claims 23-25: wherein changing said bond stress comprises applying a bond stress within the claimed ranges of 1-3 dynes/cm^2 (see page 41, line 8).

Pascual et al anticipates the instantly claimed invention directed to a method that increases bond strength by of a bacterial lectin adhesins present in purified fimbria of Salmonella and E.coli that bind to mannose or oligomannose ligands each of which are attached to a particle, in light of Spevak (1996, incorporated into Pascual et al by reference, page 59, lines 29-30) that teach particles for attaching carbohydrate ligands.

1. Since the Office does not have the facilities for examining and comparing applicant's protein with the protein of the prior art, the burden is on applicant to show a novel or unobvious difference between the claimed product and the product of the prior art (i.e., that the protein of the prior art does not possess the same functional characteristics of the claimed protein). See In re Best, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and In re Fitzgerald et al., 205 USPQ 594

2. Inherently the reference anticipates the now claimed invention. Atlas Powder Co. V IRECA, 51 USPQ2d 1943, (FED Cir. 1999) states AArtisans of ordinary skill may not recognize the inherent characteristics or functioning of the prior art...However, the discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior arts functioning, does not render the old composition patentably new to the discoverer. The Court further held that Athis same reasoning holds true when it is not a property but an ingredient which is inherently contained in the prior art.

10. Claims 1-2,4,6-9,16-17,18, 19-20, 22-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Bargatze et al, (US PG Pub. 2004/0247611, effective filing date November 23, 1998).

Bargatze et al disclose and claim a method of increasing the bond strength of an adhesion molecule (see page 25, claims 55-56 "soluble pathogen adhesins" introduced to a moving fluid that creates shear flow conditions), wherein the adhesins are contacted with carbohydrate ligands coated on beads (see page 25, claims 65-66 "carbohydrate"), the method comprising the step of :

changing the bond stress of the isolated adhesion so that the bond stress increases under shear force flow conditions (see claims 55-56 and Table 1, page 5; Example 14, page 17, and

table on page 17-18; Example 16; tables on page 20-21, especially the Microbial Pathogen carbohydrate binding protein that bind to carbohydrate ligand.) Bargatze et al anticipates the instantly claimed invention as now claimed.

3. Since the Office does not have the facilities for examining and comparing applicant's protein with the protein of the prior art, the burden is on applicant to show a novel or unobvious difference between the claimed product and the product of the prior art (i.e., that the protein of the prior art does not possess the same functional characteristics of the claimed protein). See In re Best, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and In re Fitzgerald et al., 205 USPQ 594

4. Inherently the reference anticipates the now claimed invention. Atlas Powder Co. V IRECA, 51 USPQ2d 1943, (FED Cir. 1999) states AArtisans of ordinary skill may not recognize the inherent characteristics or functioning of the prior art...However, the discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior arts functioning, does not render the old composition patentably new to the discoverer. AThe Court further held that Athis same reasoning holds true when it is not a property but an ingredient which is inherently contained in the prior art.

11. Claims 1-2, 4, 6-7 rejected under 35 U.S.C. 102(b) as being anticipated by Brooks et al (1983).

Brooks et al disclose the instantly claimed invention directed to a method comprising the step of increasing the bond strength (see page 320, paragraph 2, last full sentence; page 321, paragraph 1 "This second phase represents a marked strengthening of the aggregation and hence of bacterial adhesion induced by shear in the system") of an isolated adhesion of E.coli pili, wherein the increase in bond strength was induced by shear force (see page 327, Figure 10 and page 328, Figure 11), and wherein the ligand was A+ human erythrocytes that are known to present D-mannose/L-fucose carbohydrate ligand (see figure 2, ledger, line 3 and Figure 2 alphaMM defined at page 321, paragraph 2, line 5).

Brooks et al anticipates the instantly claimed invention as now claimed.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

13. Chang et al is cited to show cell adhesion under flow (October 2000; see figure 5).

14. EP 0222835 is cited to show pilus conjugates of carbohydrates (surface polysaccharides) and bacterial adhesions that are pili of Ecoli conjugated to an immunogen that is a pilus (see pages 29-30, claims 1, 6, 7, and 11).

15. Hartleib et al (2000) is cited to show binding of S. aureus surface adhesion to soluble vWF under flow conditions (see "flow chamber", page 2154, col. 1, paragraph 1 and Figures 6-7

16. Liang et al (Nov. 2000) measure the forces involved in polyvalent adhesion of uropathogenic E.coli to mannose presenting surfaces due to FimH adhesion, and the surface being a self-assembled monolayer (see Figure 1 and entire article)

17. Schembri et al (2000 and 2001) is cited to show biofilm formation associated with FimH.

18. Smyth et al (1996) is cited to show Fimbrial adhesions, to include Type I fimbriae (see section 2.5 and Figure 2, page 130).

19. Sokurenko et al (1998) is cited to show an in vivo shear force assay with recombinant host cells that express heterologous FimH coding sequences (see page 8923, paragraph 3).

20. Hung et al (May 2002) is cited to show mannose-BSA coated wells, to include mannotriose-BAS and D-Mannose (monomannose), see Figures 3A-D, wt and N46D, flow conditions being chromatography assay (page 907, col. 1, paragraph 1) and Figure 4 (mannose binding pocket).

21. Thankavel et al (1997) is cited to show an in vivo assay with mouse bladders and FimH fusion protein or FimH fragments under shear forces (see page 1129, Table 2 "exposed and washed repeated with sterile PBS", col. 1 and Table IV).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ginny Portner whose telephone number is (571) 272-0862. The examiner can normally be reached on flextime, but usually M-F, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey Siew can be reached on (571) 272-0787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Vgp
April 10, 2007

MARK NAVARRO
PRIMARY EXAMINER